

April 5, 2005

Note to readers:

Attached is a paper I have just prepared on "The Critical Need to Examine More Carefully the Role of Liquefied Natural Gas (LNG) in Meeting Future U.S. Energy Needs."

While this paper is addressed to a long-term issue, rather than current, day-to-day events in the market, I believe the issues it addresses are important.

I have put a fair amount of time and effort into preparing the paper. I hope you will find it helpful.

Unlike my regular Weekly Market Reports, which are confidential and should not be circulated to third parties, I would like this paper to have as wide an audience as possible.

If you believe it would be helpful, therefore, please feel free to circulate this paper to anyone who you believe might be interested in the topic.

-- Andy

The Critical Need to Examine More Carefully  
The Role of Liquefied Natural Gas (LNG)  
In Meeting Future U.S. Energy Needs

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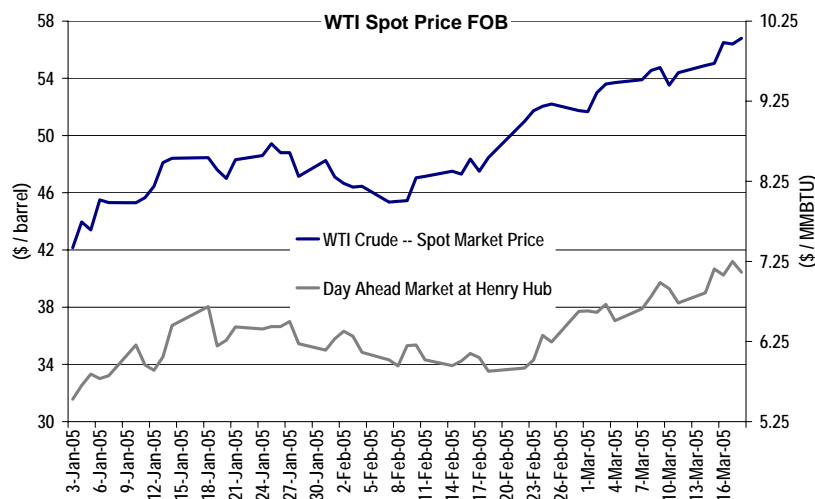
The Critical Need to Examine More Carefully  
The Role of Liquefied Natural Gas (LNG)  
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As a result of soaring oil prices, the U.S. currently is more focused on energy issues than at any time since the 1970's. While higher oil prices are the immediate catalyst for this interest, however, dependence upon imported oil is not the only or even necessarily the most important energy-related threat to the U.S. economy.

Instead, over the past several years, the U.S. has experienced even steeper increases in the price of natural gas -- increases that recently have again begun to accelerate in tandem with increases in the price of oil.

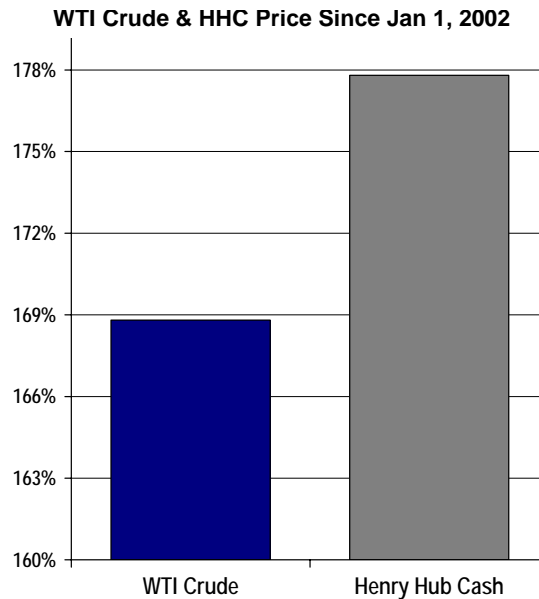
In the first 12 weeks of this year, for example, both the price of West Texas Intermediate crude oil and prices for physical delivery of natural gas in the Day Ahead market at Henry Hub in Louisiana (one of the most important trading hubs in the U.S.) increased by more than 30 %:

**Figure 1**  
**Spot Market Prices for West Texas Crude**  
**And Natural Gas since January 1<sup>st</sup>**



Over the past 36 months, however, the price of natural gas has increased even more sharply than the price oil:

**Figure 2**  
Increase in Prices since January 1st, 2002  
WTI Crude vs. Cash Market Price for Natural Gas



More recently, electricity prices also have begun to increase, particularly at the wholesale level. Unless natural gas prices fall significantly, even steeper increases are likely this coming summer.

This is because in the summer months gas-fired electric generating units increasingly are the marginal source of supply in every Region of the country. As a result, even in Regions in which electricity is generated primarily by lower-cost coal or nuclear units, the market clearing price for electricity in the wholesale market in the summer months increasingly is determined by the cost of operating gas-fired plants.

#### Need to Comprehensively Reassess U.S. Energy Policy

As increased attention is being given to the need to reassess U.S. energy policy, therefore, it is essential that we develop a strategy to help minimize further increases in the cost of electricity and natural gas, as well as to minimize our dependence upon imported oil.

As shown in Table 1 below, direct use of natural gas and generation of electricity --in which natural gas is playing an increasingly important role -- currently account for 56.3 % of total fuel use in the U.S.:

Table 1  
Total U.S. Energy Use – 2004  
(Quad BTU)

Energy Source	Fuel Consumption	Percentage of Total U.S. Fuel Use
Generation of Electricity	38.86 Quad Btu (Incl. Use of 5.33 Quad Btu of Natural Gas and 1.20 Quad Btu of Oil)	38.9 %
Direct Use of Natural Gas by Residential, Commercial & Industrial Users	17.40 Quad Btu	17.4 %
Direct Use of Oil (Including Transportation)	38.86 Quad Btu (Incl. 2.85 Quad Btu of Natural Gas Liquids)	38.9 %
Direct Use of Coal & Other Fuels	4.69 Quad Btu	4.7 %
<b>Total U.S.</b>	<b>99.81 Quad Btu</b>	<b>100.0 %</b>

Source: Energy Information Administration (EIA), Annual Energy Outlook 2005,  
Supplemental Table 10

This is almost 1.5 X total U.S. use of oil (less than 3 % of which is used to generate electricity).

Further, while almost 70 % of oil use is in the transportation sector, the cost of natural gas and electricity has a particularly significant impact on the ability of U.S. industry and U.S. farmers (who grow crops using fertilizer manufactured from natural gas) to compete in world markets.

For many years, the U.S. enjoyed adequate supplies of reasonably cost electricity and natural gas. This access to reasonably priced energy provided a major competitive advantage to U.S. industry and played a significant role in helping to minimize inflation.

In recent months, however, the clear trend has been for the pricing of *all* major energy sources in the U.S., *including* natural gas and the wholesale market price of electricity, increasingly to be driven by increases in the price of oil (in the case of electricity, because of the relationship to the price of natural gas).

This trend, if allowed to continue, is likely to have far-reaching consequences for the continued health of the U.S. economy, potentially magnifying several-fold the adverse impact of any further increase in the price of oil. If oil prices increase to \$ 65 per barrel, for example, rather than an adverse impact of \$ 80 billion per year on the U.S. economy, the net drain ultimately could become nearly 3 X as great (i.e., a quarter of a trillion dollars per year or more).

As a result, the growth rate of the U.S. economy could fall sharply and the ability of U.S. industry to compete in world markets could be seriously impaired.

We face an urgent need, therefore, to develop a comprehensive strategy to assure reliable, low cost supplies of electricity and natural gas – as well as to limit our dependence upon imported oil.

## Reasons for Focusing on Liquefied Natural Gas (LNG)

This paper will not attempt to address comprehensively all of the issues which should be considered in developing a comprehensive energy strategy for the U.S. Instead, it has a more modest goal.

Specifically, the paper will focus on one particularly important issue: the potential role of increased imports of Liquefied Natural Gas (LNG) in meeting our future energy needs.

Further, even with respect to this issue, the objective of this paper is limited: to outline certain specific issues and questions which may be important to consider in assessing the extent to which the U.S. should rely on increased imports of LNG to satisfy the future energy requirements of the U.S. economy.

In focusing on this issue, the author of this paper wishes to make clear that he believes that increased imports of LNG can, should and *almost certainly will* play an important role in meeting future U.S. energy needs.

As the paper will discuss, there is an urgent need to increase the energy supplies available to the U.S. economy. Further, there is no question that significant new supplies of LNG can be developed and delivered to the U.S. market over the next 7 to 10 years.

To date, much of the debate in the U.S. regarding LNG has focused on potential concerns regarding the potential safety of delivering LNG into U.S. ports and the possible impact of these safety issues on the ability to site new delivery terminals, particularly in or near urban centers.

Issues regarding LNG safety certainly deserve to be considered carefully.

The industry's track record in shipping LNG, however, is solid and the available evidence tends to indicate that the safety concerns relating to shipment of LNG are no greater than for a number of other substances routinely transported into U.S. harbors.

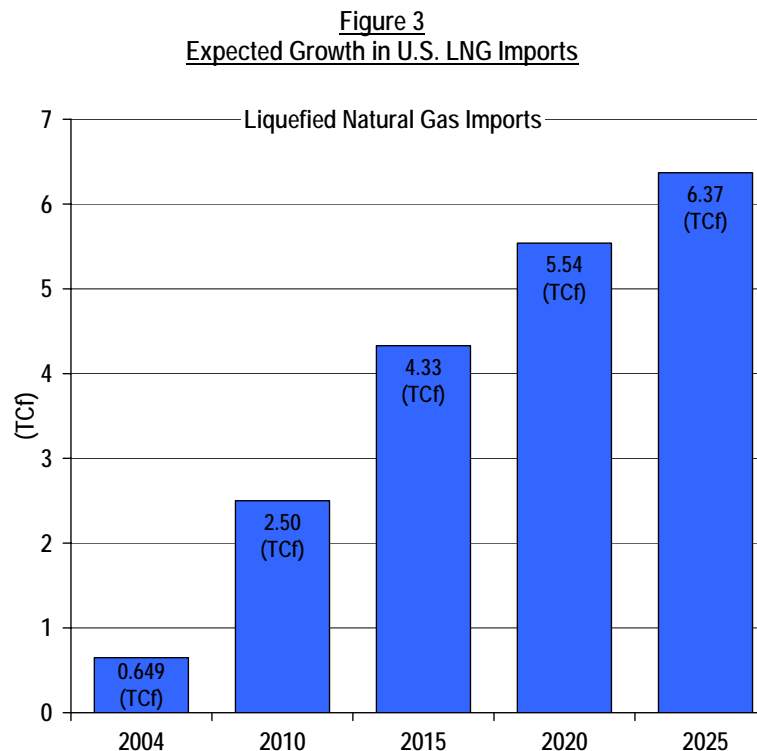
There appears to be little question, therefore, that increased imports of LNG potentially can play an important role in meeting increased U.S. energy needs, at least in those circumstances in which it is possible to obtain supplies: (i) from reliable suppliers; (ii) pursuant to firm, long-term commitments; (iii) made directly to end users of natural gas, generators or Local Distribution Companies (LDC's); (iv) with guaranteed, commercially binding commencement dates for deliveries; (v) at reasonable prices; (vi) that are *not* indexed to the price of oil; and (vii) pursuant to contracts that provide adequate protections for purchasers in the event suppliers are unable to make delivery.

At the same time, while there is no question that LNG has an important role to play in future U.S. energy strategy, there is a critical need to examine more carefully than any federal or state Agency appears to have examined to date *the extent to which* the U.S. should rely on LNG vs. other alternative domestic sources of energy supply available to the U.S. market.

This urgent need to evaluate other available sources of supply arises for several reasons:

- First, the choices which are made over the next few years regarding how to meet future U.S. energy needs will have far-reaching economic repercussions for the U.S. economy. These repercussions are likely to be long-lasting in nature, since LNG purchases typically involve commitments intended to last for at least 20 to 25 years. Given the huge financial commitments required, as a practical matter, once these commitments are made, they may largely preclude the U.S. from deploying alternative energy strategies for many years.

The U.S. Energy Information Administration's (EIA's) most recent long-term forecast, for example, Annual Energy Outlook 2005 (AEO 2005), estimates that over the next 20 years, total annual imports of LNG will grow from 2004 levels of 649.1 BCf per year (approximately 2.9 % of the total current U.S. natural gas market) to 6.37 Trillion Cubic Feet of year – an increase of 881 %:



Source: Annual Energy Outlook 2005, Supplemental Table 104.

This is a staggering amount of energy.

*While increased imports of LNG are expected to come from several Regions, by way of comparison, in BTU equivalent terms, 6.37 TCf is approximately 20 % greater than the total amount of oil the U.S. imported from the Middle East in 2004 (which last year was just under a billion barrels). A decision to import quantities of fuel of this magnitude, if implemented, could have huge adverse impacts on the strength of the U.S. economy, the*

U.S. balance of payments deficit and the value of the dollar.

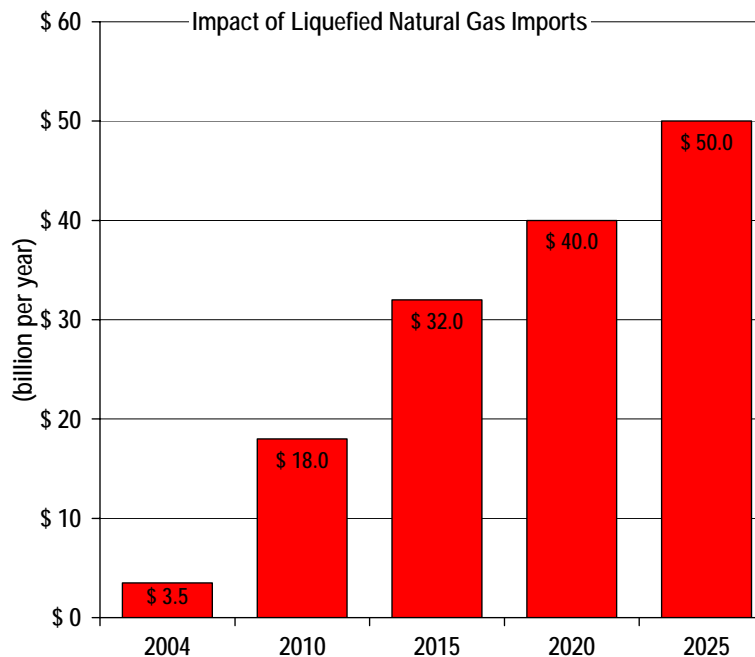
Supplying this amount LNG will require the construction of a number of massive new LNG supply projects, expected to be located principally in the Middle East and West Africa. The cost of constructing these projects is likely to total at least \$ 100 to 125 billion. A portion of this amount (perhaps 10 to 15 %) will be spent on delivery terminals and re-gasification facilities located in the U.S. Most of the required capital expenditures, however, will be for new production facilities and liquefaction facilities in the host country (the most expensive component in the supply chain) or for the construction of the specialized tankers required to ship LNG (generally by ship manufacturers in Asia).

These expenditures are expected to be financed based upon long-term, 20 to 25 year supply contracts, supported by purchase commitments by end use purchasers in the U.S. for the portion of the output of these projects delivered to the U.S. market.

While the price terms for these contracts have yet to be determined, given current prices for natural gas and likely future trends, over the 20 to 25 year life of these contracts, total required payments for the portion of the supplies delivered to the U.S. could easily total between \$ 1 trillion and 4 trillion in \$ 2005.

If EIA's recent forecast proves to be accurate, by as soon as 2010, the net adverse impact on the U.S. balance of deficit of increased imports of LNG is likely to total at least \$ 1 billion per month (i.e., \$ 12 billion per year). By 2025, depending upon the final price terms, this figure could easily increase to \$ 50 to 125 billion per year:

**Figure 4**  
**Potential Increase in Balance of Payments Deficit**  
**Due to Increased Imports of LNG**





The potential 2025 contribution of LNG imports to the U.S balance of payments deficit is potentially 1 to 2 X the current **total** U.S. balance of trade deficit, which is at an all time record level (viz., \$ 58.3 billion for January of 2005, the most recent month for which data is available).

Even for a country with a \$ 13 trillion per year Gross Domestic Product (GDP), these are staggering figures. Over the 20 to 25 year life of these new supply projects, the required payments by U.S. purchasers are likely to total more than the budget for the entire federal government (with over 2.5 million employees) in any one year.

Even at the low end of the \$ 1 to 4 trillion range (again, measured in \$ 2005), the total outflow of dollars would exceed the total net U.S. balance of payments deficit for the past decade; at the high end of the range, it would exceed the aggregate net balance of payments deficit in U.S. history.

Over time, turning to another type of imported fuel (other than imported oil) to meet a large portion of this country's incremental energy needs, rather than attempting to develop alternative, U.S.-based sources of supply will result in the loss of at least tens of thousands -- and possibly hundreds of thousands -- of American jobs.

Further, supporting the construction of \$ 100 billion or more in infrastructure elsewhere in the world rather than here in the U.S. and, over a period of years, sending \$ 1 trillion or more in revenues overseas will have huge implications for federal, state and local tax revenues and for the value of the U.S. dollar.

Finally, by definition, the fact that the infrastructure is located elsewhere in the world also increases the risk that supplies from time to time will be interrupted or that production facilities initially built based upon commitments by U.S. purchasers ultimately will fall into other hands or be diverted to supply the needs of other customers.

None of this means that massively increasing our dependence upon imports of LNG is necessarily a mistake.

Instead, there may be offsetting benefits that are sufficient to justify a massive increase in our dependence upon another type of imported fuel (in addition to imported oil) or ways to minimize at least some of the potential risks of a heavily LNG-dependent strategy for meeting future U.S. energy needs.

It does suggest, however, that before a commitment is made to massively increase U.S. dependence upon LNG, there should be a thorough and careful examination of the risks and benefits of LNG vs. potential alternative domestic sources of supply that may have the potential to better serve the overall interests of the U.S. economy.

- This is especially true since, essentially by default, a strategy of massively increasing U.S. dependence upon LNG is rapidly becoming the near-exclusive strategy for meeting incremental U.S. energy requirements for both natural gas and electricity. Absent a

concerted effort to develop alternative sources of supply, therefore, if this strategy fails, for a period of many years, there may be no alternative source of energy available to meet a significant portion of the basic energy requirements of the U.S. economy.

If EIA's most recent projections prove to be accurate, over the next two decades, even assuming the proposed new Alaskan natural gas pipeline is completed, increased imports of LNG will become the sole source of supply to meet almost 2/3<sup>rd</sup>'s of the expected incremental natural gas supply needs of the U.S. market (i.e., specifically, 65.4 %).

If the proposed Alaskan natural gas pipeline is *not* completed for any reason or is delayed substantially beyond its current projected in-service date (which EIA estimates is likely to be no earlier than 2016), the U.S. will be dependent upon increased imports of LNG for an astounding **87.7 %** of its incremental supplies of natural gas.

Quite literally, therefore, our current energy strategy – to the extent we have one – leaves us critically dependent upon our ability to drastically increase imports of LNG as potentially nearly the sole incremental source of supply of natural gas, other than natural gas that might be brought into the lower-48 States from Alaska, available to meet home heating requirements and to provide fuel and feedstock to U.S. manufacturers.

In addition, except for natural gas from Alaska starting in 2016 or some subsequent year, it is potentially nearly the sole source of incremental fuel for the country's gas-fired generating units, which now account for more than 40 % of total generating capacity in the U.S.

If the expected increase in supplies of LNG fails to materialize for any reason, therefore, – i.e., either because worldwide LNG production capability is not ramped up as quickly as the proponents of a heavily LNG-dependent strategy currently hope, or because we are unable or unwilling to site new delivery terminals in the U.S. or because China or some of our European allies or any other country outbids us for the limited amounts of newly-available supplies that we hope will become available during the next 10 to 15 years, we may be left with no fuel available to expand the output of our existing fleet of gas-fired units.

As a result, since our nuclear units and many of our largest and most efficient existing coal-fired units already are running at full capacity, we may be left without an alternative strategy in place to meet the incremental electricity needs of our economy. For a period of time, therefore, the growth of the U.S. economy may largely come to a halt.

- There is no reason, however, why we need to be trapped in this position. Instead, there almost certainly are other means available to meet our incremental energy requirements. These options are likely to be less expensive, in pure dollar terms, and almost certainly would be preferable strategically and from the overall standpoint of the U.S. economy. These options are not likely to be available in a timely manner, however, unless efforts begin soon to develop and implement a comprehensive national energy strategy that provides for the development of alternative, domestically-based sources of supply on an

urgent, "highest-priority-possible" basis.

The alternative means of meeting our future energy needs include more intensive efforts than have been proposed to date to accelerate energy conservation, renewable energy and development of on-shore and off-shore domestic sources of natural gas.

In addition, they also include a potential all-out, crash effort to speed the development and deployment of coal gasification, both to provide fuel for new electric generation facilities and to provide an alternative source of supply for some of the gas-fired power plants that have been constructed over the past 5 years.

Many of these alternatives could prove to be far less costly than importing LNG, especially in a global market in which it has become increasingly likely that LNG prices will be indexed to the price of oil (as already often is the case for sales for LNG to purchasers in other countries), at a time when the price for oil could spiral out of control at any point.

These alternatives potentially could avoid an unneeded drain of \$ 1 trillion or more on the U.S. balance of payments, during a period in which there is an urgent need to *reduce* the current sky-rocketing U.S. balance of payments deficit and to strengthen the U.S. dollar.

In addition, they all share the further benefit that the jobs and infrastructure required to provide these sources of fuel all would be located in the U.S., providing tens of thousands of permanent new U.S.-based jobs and increasing federal, state and local tax revenues.

These alternative domestic sources of supply also share, however, several other important characteristics:

- For many of these alternatives (other than some conservation projects), even to implement a single project at a specific site may require a lead time of 3 to 4 years (and in some instances longer), to obtain necessary permits and financing and to fabricate and install the necessary equipment.
- To implement these alternatives on the requisite scale, even longer lead times may be required -- even for major conservation initiatives.
- Finally, as a practical matter, given the perceived risks, private developers are unlikely to risk large amounts of capital on these projects without strong assurances that federal and state governments will support the timely completion of these projects.

Unless we find a way, therefore, to move forward immediately with the development and implementation of a comprehensive new national energy program on an urgent, "highest, priority possible basis," we almost certainly will instead simply continue to drift down the path we have been following for the past 24 to 36 months.

Specifically, essentially by default, the U.S. will become dependent upon the potential that it *might* be able to dramatically increase imports of LNG as the near exclusive means to meet its

incremental energy needs for natural gas and electricity, both later this decade and throughout the next 20 years and commit itself to a whole new era of *expanded* dependence upon imported fuels, with LNG imports over a period of years potentially matching and then *exceeding* (in BTU equivalent terms) the current level of oil imports from the Middle East.

Further, this fundamental shift in energy strategy will have been allowed to occur without any rigorous analysis – or, for that matter, *any meaningful analysis at all at either the federal or state level*, of: (i) whether the massive increases in LNG imports that EIA currently projects for 2010, 2015 and subsequent years actually is achievable; (ii) how significant the risk is that we will fall short of these goals; or (iii) what the consequences might be if for any reason the level of LNG imports assumed in EIA's estimates is not achieved.

Nor does there appear ever to have been any rigorous analysis – or indeed *any analysis at all* -- of what the alternatives might be to a heavily LNG-dependent strategy and the potential risks and benefits of these potential alternatives in terms of:

- Reliability of U.S. energy supply;
- The potential for severe price shocks and heightened price volatility in the U.S. natural gas and electricity markets;
- Job loss or job creation in the U.S. economy;
- The continued ability of U.S. industry and U.S. farmers (who depend upon the availability of competitively-priced fertilizer) to compete in world markets;
- The U.S. balance of payments deficit; and/or
- The future growth of the U.S. economy.

Further, at least to date, no effort appears to have been made to determine what the possible U.S. "fall-back" strategy if:

- The global LNG market does not develop as rapidly as EIA currently hopes;
- Other countries outbid the U.S. for available supplies; or
- Supplies are interrupted due to political unrest, labor strikes, terrorist incidents, wars or any of the other factors that frequently interrupt international shipments of oil.

*Instead, one of the most important policy choices we've ever faced literally is being made by default.*

The lack of any careful examination of these issues is particularly troubling for a number of reasons:

1. The possibility that LNG might play an important role in meeting U.S. energy needs has arisen only recently. As recently as 36 months ago, for example, the U.S. Energy Information Administration (EIA) indicated that LNG imports were "not expected to become a major source of U.S. [energy] supply." Annual Energy Outlook 2002 at page 82.

EIA's most recent forecast, however, Annual Energy Outlook 2005, assumes a compound annual growth rate for imports of LNG, beginning in 2008, of 12.2% per year -- more than 5 X the expected growth rate for imported oil. See AEO 2005, Supplemental Table 104.

2. Unlike the global oil industry or the North American natural gas industry, the global LNG market still is at a comparatively early stage in its development. The current size of the global market, for example, is less than 1/5<sup>th</sup> of the size of the North American market for natural gas. It is designed predominantly to serve just three countries: Japan, South Korea and Taiwan. Collectively, these countries account for more than 2/3<sup>rd</sup>'s of the current world market.

Further, the output of most existing LNG projects and all but a small share of the output from the limited number of projects that currently are under construction in various parts of the world already is committed to other purchasers on a long-term basis.

Virtually all of the incremental LNG supplies EIA assumes will be available to the U.S. market in future years, therefore -- even as soon as 2008 -- must be obtained from projects that have not yet been built and shipped using specialized tankers that have yet been constructed.

In addition, even though the lead time for building new LNG projects generally is estimated to be at least 4 to 5 years, even meeting EIA's projected deliveries for 2008 will require obtaining substantial production from projects that have not yet even broken ground -- or in some instances, even signed binding commercial agreements or begun to seek financing.

Further, even though the U.S. has become critically dependent upon meeting the import levels assumed in EIA's estimates in order to be able to satisfy the basic energy needs of the U.S. economy, EIA has not identified the specific projects on which its estimates are based -- even during the 2008 through 2010 time frame.

Nor has it identified major milestones that must be met for these increased import levels to be achieved.

It also is not attempting to report publicly on a current basis on the status of pending projects.

Instead, as it so often does, it has merely published a set of estimates of total imports and said, in effect "trust us" -- at least until next year, when its estimates presumably might once again be radically revised.

3. Longer term, there still is a great deal of uncertainty regarding how many new LNG projects actually will be constructed during the next decade.

Despite the intense interest in LNG, few if any new projects actually started construction anywhere in the world in 2004.

Further, neither EIA nor any other federal or state Agency appears to have ever undertaken any rigorous assessment of how many new projects actually are likely to be built over the next 20 years. No assessment appears to have been made, for example, of whether the host companies are likely to develop a significant percentage of their reserves within a relatively compressed time frame (which many estimates implicitly assume) or instead potentially decide to phase the development of the finite reserves each country controls over a period of several decades (as prudence would appear to dictate) -- in which case it is possible that only a limited number of projects will be initiated in the next few years beyond those already under way and the price of LNG could prove to be significantly higher than EIA assumes.

Instead, EIA appears to have simply accepted at face value broad-brush assertions regarding the *potential* amount of new LNG production that conceivably *might* be developed on a world-wide scale in a relatively short period of time *assuming* that both the host companies and the super-major international oil companies attempt to build new supply projects on an extremely aggressive schedule, without considering whether it is necessarily in their economic best interests to do so (which it almost certainly is not).

(Note, in this regard, that the government of Qatar, one of three countries -- along with Iran and Russia -- generally considered to have the greatest potential to develop new capacity - - recently announced a moratorium of unspecified length on new projects, at a time when a high percentage of the output from projects already under way in Qatar is committed to other countries. At close to the same time it announced its moratorium, it also abruptly cut by almost 40 % ExxonMobil's expected share of the 2<sup>nd</sup> train at Qatargas II, which ExxonMobil has been including in its development plans for almost 4 years. This share was awarded instead to the French firm, Total. Neither ExxonMobil nor Total have yet made any public commitment to ship any portion of the output of Qatargas II to the U.S. market, even though it is one of the last projects expected to be built in Qatar which is not subject to the moratorium.)

4. Further, even if a significant number of new projects are successfully completed over the next several years, competition for the output from these projects is likely to be intense.

Like the U.S., much of the world is currently planning to turn increasingly to the use of natural gas for space heating, rather than heating oil and planning to rely on gas-fired generation to meet nearly all of its incremental demand for electricity.

As a result, world-wide demand for natural gas is expected to grow at a rapid rate.

Also like the U.S., however, most major natural-gas consuming countries are not currently expected to be self-sufficient in future years (including countries, such as Great Britain, that currently are meeting all of their own needs).

As a result, the U.S. is likely to face stiff competition for the limited new supplies of LNG

that become available on the world market from China, India, the United Kingdom, Spain, France, South Korea, Japan, Mexico and many other countries, further limiting the potential new supplies that are likely to become available to the U.S. market.

5. Despite the overall strength of the U.S. economy, the U.S. could be at a significant disadvantage in competing for these supplies.

We are running the largest trade deficit in U.S. history – and the largest trade deficit of any country in the world. In part as a direct result, the value of the dollar is expected to continue to decline sharply over the next several years.

Further, because of our location, for every current producer other than Trinidad, the amount of time a tanker must travel in order to complete a delivery to the U.S. and therefore the cost of shipping LNG to the U.S. market is significantly greater than for any other potential customer except Mexico. With tankers potentially costing up to \$ 250 million each, this is a significant disincentive to sell into the U.S. market.

It also means that, by definition, a U.S. manufacturer using LNG will be at a competitive disadvantage to almost every other manufacturer worldwide, since (due to the shipping cost differential) the cost of LNG delivered to the U.S. market inevitably will be higher than in any other market in the world.

6. In addition, neither EIA nor industry representatives appear to have given adequate consideration to the potential consequences of the supply disruptions that are virtually certain to occur periodically if the U.S. shifts to a strategy in which it will be relying upon supplies from a few large LNG mega-projects potentially located thousands of miles from the U.S. rather than tens of thousands of discrete natural gas wells, even the largest of which accounts for only a tiny fraction of 1 % of total U.S. supply.

In a global LNG market, with supplies being shipped half across the world and the stability of the host government not always a given, periodic interruptions in supply in all likelihood are inevitable.

As the International Energy Agency (IEA) has observed with respect to the global oil market, supply disruptions can arise due to any of a variety of causes, including “accidents, unplanned or unannounced maintenance, technical problems, labor strikes, political unrest, guerilla activity, wars and weather-related supply losses.” See IEA Monthly Oil Report for February, 2005 at page 12.

Every one of these factors is potentially just as applicable to a large LNG mega-supply project located half way around the world as it is to the international oil market.

Further, at least some of the expected sources of supply (particularly Nigeria, but also Venezuela and to some degree Statoil in Norway) have been among the most prone to political or labor-related strikes (or in the case of Nigeria, political unrest) of any producers in the world.

If we rely heavily on LNG imports from West Africa or the Middle East, therefore, and the government in a host country is overthrown, a strike temporarily shuts down production or, in the case of a Middle East producer, shipments through the Strait of Hormuz are temporarily blocked, there may be a very real risk that we'll not be able to keep homes warm in the middle of the winter or that the lights will go out in the summer.

Even if shortages never occur, however, from a pricing standpoint, the potential consequences of a supply disruption in the LNG market, even for a short period, could also be severe – even if it involves only a single major LNG project supplying the U.S. market.

This is in part due to differences in the feasibility and cost of storing oil and the cost and feasibility of storing natural gas, the resulting differences in the amount of oil and natural gas that are maintained in storage, and the increased risk of severe price spikes this creates in the U.S. market for natural gas.

Oil, as a liquid, can be stored relatively inexpensively. In part as a result, industry and government have developed huge reserves. Total U.S. reserves of crude oil, for example, including both commercial reserves and the Strategic Petroleum Reserve maintained by the U.S. government, are sufficient to offset a total cut-off of oil from the Middle East for over 12 months.

At least to a significant degree, this reduces the severity of the price shocks that occur when temporary supply disruptions occur -- such as the strikes and guerilla-war related supply interruptions that have occurred frequently in recent years in Nigeria.

By contrast, the cost of storing natural gas is far greater – either as a gas or as LNG.

As a result, just barely enough storage capacity exists in the U.S. to meet expected peak period needs during the winter.

While the natural gas industry in the U.S. is seldom described in this way, because of the high costs associated with natural gas storage (both to build storage facilities and to keep them stocked) the natural gas market in the U.S. is designed to operate with essentially zero spare capacity over the course of any given annual 12-month cycle.

Natural gas is injected into storage during a 7-month injection season. At the end of the injection season (in late October), if the industry has met its targets, a large amount of natural gas will temporarily be contained in underground storage facilities (viz., approximately 3,250 to 3,350 Bcf).

This creates the near-universal impression (even within the industry) that the natural gas market always maintains a substantial reserve.

In fact, however, if supply and demand are more or less balanced for the year as a whole and weather over the course of the year matches historical norms, all or virtually all of the natural gas injected into storage during the storage Refill Season is likely to be needed to meet winter needs.



While there still may be a few hundred BCf of natural gas left in storage at the end of the winter heating season, as we saw three winters ago when the amount of natural gas in storage was reduced to 730 BCf, much of that amount is needed simply to maintain operating pressure in the pipelines.

Further, at least some amount always must be held back to guard against the possibility of one more wave of “cold weather.”

As a practical matter, therefore, there ordinarily isn’t any meaningful amount available as a reserve to protect against a significant interruption of supply.

In the natural gas industry, therefore, there is no natural gas “Strategic Reserve” comparable to the Strategic Petroleum Reserve.” Nor is there a “natural gas stockpile” comparable to a coal stockpile.

Instead, largely because it would be prohibitively expensive to construct the required storage facilities and fill them with natural gas held in reserve strictly to protect against disruptions in supply or other emergency use, the industry effectively operates with near-zero reserves over the course of any given 12-month cycle.

As a result, in the natural gas market, even minor swings in expected supply or demand routinely cause significant swings in the market price of natural gas.

We saw vividly last fall, for example, the impact on the market price of natural gas of the temporary loss of approximately 2.2 BCf per day of production from the Gulf of Mexico due to Hurricane Ivan. At its peak, the cash market price for natural gas jumped by as much as 60 % and the price for natural gas futures traded on NYMEX sky-rocketed to as high as \$ 10.00 per MMBTU.

No other event affecting the natural gas market in the U.S. has ever caused a temporary loss of supply even close to the magnitude of the loss of production caused by Hurricane Ivan; instead, from a domestic supply standpoint, the temporary loss of production that resulted from Hurricane Ivan was a classic “1 in a 100 year” event.

By contrast, however, the production temporarily lost due to the storm – i.e., at its peak, 2.2 BCf per day -- is the same scale size as *each one* of the largest LNG supply projects targeting the U.S. market.

The temporary loss of supply from a single LNG project, therefore, potentially could have an impact on the U.S. market similar to the extreme strikes that resulted from Hurricane Ivan.

No one has yet proposed that we create a Strategic Reserve for natural gas – presumably in part because the cost to construct and maintain a storage facility of the requisite size would be many times greater than the cost for constructing a storage facility of comparable size for oil.

Further, if the cost of constructing such a facility and maintaining a reserve adequate to protect against potential temporary interruptions of supplies of LNG were included as a "tax" on the cost of importing LNG, it might make it prohibitively expensive to import LNG into the U.S. market.

Absent a reserve or some other form of reliable back-up supply, however, an interruption of deliveries from any one of these projects, for any reason, or the unavailability of one or more U.S. re-gasification facilities for an extended period could expose the U.S. natural gas market to price shocks just as severe as we experienced last fall after Hurricane Ivan struck the Gulf.

In a market which already exceeds 60 Bcf a day, even if such an interruption only lasted 2 or 3 months, it could easily add \$ 10 billion or more to the costs incurred by U.S. consumers of natural gas each time such a disruption in supplies occurs.

It is not entirely clear, therefore, whether a massive increase in U.S. dependence upon imports of LNG should even be allowed without determining before new import permits are granted who will bear the costs when such supply interruptions occur – as almost certainly periodically will be the case.

7. Finally, a heavily LNG-dependent strategy raises far-reaching issues regarding the potential increased exposure of the U.S. natural gas and electricity markets to frequent and extreme price shocks that might result from increased dependence upon LNG even in instances in which no supply disruption has occurred.

At least to date, these issues do not appear to have been adequately addressed – or, for that matter, even considered – by regulators at either the federal or state level.

This omission is in some respects surprising, since the potential problem that arises closely parallels an issue that has become the central focus of much of the Federal Energy Regulatory Commission's (FERC's) efforts to regulate the wholesale power markets – viz., the potential ability of a so called "pivotal supplier" in the market for electric generation to raise prices at will.

In electricity markets, a pivotal supplier is any supplier whose market share exceeds the amount of excess capacity available to serve a particular market.

Because of the long lead time required to add new electric generating capacity, at least in theory, in a de-regulated market, during some hours of the year, a pivotal supplier can raise the market clearing price for electricity in the wholesale market to whatever level it chooses simply by withholding from the market sufficient capacity so that there are not enough other sources of supply available for the local service provider to be able to serve total electricity demand in its service territory without purchasing some or all of the pivotal supplier's remaining output at whatever price the pivotal supplier chooses to demand.

Since the California crisis in 2000, the FERC has devoted a great deal of time and effort to addressing this potential problem – not just as it potentially applied to the 2000 crisis in

California, but as a major issue potentially affecting wholesale power markets nationwide.

One of the primary allegations made in connection with the California crisis is that during the height of the crisis, “pivotal generators” in California with “market power” decided to deliberately withhold from the market a portion of the capacity that was available to serve the California market in order to artificially raise the spot market price of electricity. (This allegation has been vigorously disputed by the generators who are alleged to have engaged in this conduct.)

Petitioners in proceedings relating to the California crisis have alleged that deliberate withholding of capacity by pivotal suppliers led to billions of dollars in increased costs for electricity in California alone in a period of just a few months.

Whether or not the specific allegations that have been made in connection with the California crisis are factually true, electricity markets are thought to be particularly vulnerable to this form of price manipulation, since often only a limited number of generators are in a position to serve a particular geographic market – not just in California but in many other parts of the U.S.

While many of the claims relating to the California crisis have been settled, in the electricity context, the FERC has taken the problem of the pivotal supplier very seriously, recognizing that the only solution might be to re-impose price restrictions on pivot suppliers during any portion of any year in which a pivotal supplier might have the ability to exercise market power.

The domestic natural gas industry as it is currently structured, however, generally has been thought to be immune from the problem of the pivotal supplier.

This is largely because there are literally hundreds of producers, no one of whom has more than a small share of total production. In addition, there are a large number of individual wells (currently, over 320,000 in the U.S. and another 40,000 + in Canada), with more than 22,000 new wells added this year in the U.S. alone.

While the largest U.S. natural gas producer (currently BP Amoco) in theory might be able to withhold sufficient production to increase the market clearing price of natural gas slightly for a brief period, in all likelihood it could do so it could only do so by cutting its own production drastically.

As a result, even if a very large producer chose to pursue such a strategy, its own profits almost certainly would decrease (since its market share would be cut significantly) and it would not be likely to profit from pursuing such a strategy.

Further, since the lead time for drilling new on-shore wells in the U.S. is relatively short (i.e., less than a year), the general expectation has been that, even if a large producer chose to engage in such conduct, other producers would quickly move in to fill the gap by increasing the number of new wells that they drilled – increasing their market share and potentially causing the larger company's market share to permanently decline.

As a practical matter, therefore, most economists have concluded that it is difficult to conceive of a circumstance in which a domestic producer of natural gas in the U.S. market as currently structured would have any incentive to attempt to cut-back on its production in order to increase prices in the U.S. market.

Indeed, it is precisely for this reason that de-regulation of wellhead prices originally was thought to be appropriate in the U.S. market and why many believe it has been such a success.

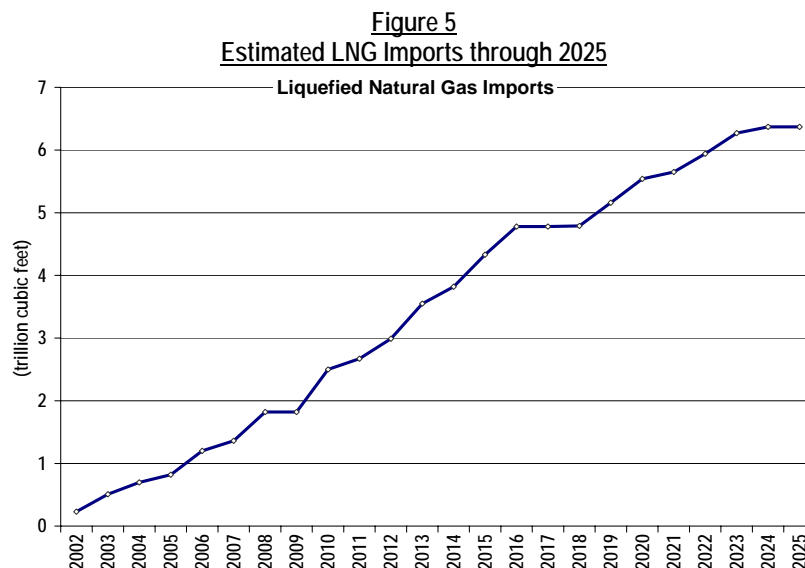
If the U.S. moves to a heavily LNG-dependent strategy, however, as it applies to the natural gas industry, the problem of the “pivotal supplier” would be likely to change radically. Further, this change will occur even assuming – *as the author of this paper does* – that no LNG supplier ever deliberately withholds a single molecule of supplies from the U.S. market for the specific purpose of raising prices in the U.S. market.

The problem in a nutshell is this:

If EIA’s estimates prove to be accurate, beginning as soon as 2008, the total amount of LNG imported into the U.S. -- which already has increased by 419 BCf over the past over the past two years -- will begin to increase at an even more rapid rate.

By 2010, for example, EIA projects that LNG imports will increase from 2004 levels of 649.1 BCf per year (i.e., an average of just over 1.75 BCf/day) to 2.50 TCf per year (or almost 7 BCf/day).

By 2015, this figure is expected to increase to an astounding 4.33 TCf (i.e., almost 12 BCf/day) – at which point it would account for over 15 % of total U.S. supplies of natural gas (more than 5 X the current market share of 2.9 %):



By 2025, this figure would increase to 6.37 TCf (i.e., just under 17.5 BCf/day) – which equates to 21.7 % of expected total U.S. natural gas consumption in that year.

Unlike current North American production, however, this 17.5 BCf/day is *not* expected to be obtained from hundreds of different suppliers, each of whom is expected to have a relatively small market share.

Instead, it is expected to be obtained from a small number of huge “mega-projects,” much of the output will be controlled by a small number of large suppliers. Further:

- By definition, these projects will be specifically designed so that at a moment’s notice the output from these projects can be re-directed literally to any port in the world in which there is a receiving terminal for LNG;
- The companies who will control this output are likely to be large, multi-national companies that operate on a global scale (e.g., Royal Dutch Shell, Tractabel, Statoil, BP, Total, ExxonMobil, ConocoPhillips and ChevronTexaco); and
- These companies – both those whose headquarters are in the U.S. and those that are not – are legally obligated to serve the best interests of their shareholders.

This combination of circumstances -- none of which assumes any wrongful conduct by any of these companies – potentially poses a unique set of risks to the U.S. market, which to date appear to have been entirely ignored in the public debate regarding LNG.

These risks arise precisely because these companies are legally obligated to – and presumably should and will – act in a manner that serves the best interests of their shareholders, as long as it conforms to applicable laws.

As a result, they presumably will generally sell the output under their control wherever it can fetch the highest price; indeed, in a free market system, that’s precisely what we *want* them to do in order for the market as a whole to function as efficiently as possible (i.e., in this instance, the new “global” market for LNG).

A significant portion of this output could well be sold under long-term contracts. To the extent this occurs, if the contracts are binding and enforceable *and lock the supplier into delivering the LNG into the U.S. market* on a long-term basis, at least a portion of the output from these projects presumably will be certain to reach the U.S. market (i.e., it will not be subject to being withheld by the supplier, at least without penalties for breach of contract, even though the supplier might otherwise arguably satisfy the conditions necessary to qualify as a “pivotal supplier” with the potential ability to exercise “market power” by withholding needed supplies from the U.S. market).

It is quite possible, however, that even those contracts which lock-in delivery into the U.S. market will *not* set a fixed price for the sale. If so, the purchaser may still be vulnerable to steep price increases, if other LNG supplies under the control of the same LNG supplier or

any other LNG supplier serving the U.S. market are diverted to another market.

More importantly, however, at least the way the LNG industry currently appears to be evolving, there appears to be a substantial likelihood that the delivery point for a significant portion of the output from many of the major projects will be left flexible.

Specifically, for a significant portion of the output of each major project, the LNG supplier who signs the initial contract with the producing country (e.g., Royal Dutch Shell, Tractabel, BP, ExxonMobil, etc.), will have discretion as to the market or markets to which that supply will be delivered.

At various points in time, some of that discretion subsequently might be negotiated away by contract, as a result of suppliers making binding contractual commitments of varying durations (e.g., one month, 1 year, 10 years) to specific customers in specific markets.

But some of it may not (i.e., control over the delivery point may be retained for short-term sales).

Further, at least under current law, neither the Federal Energy Regulatory Commission nor any state Public Utility Commission will necessarily have any direct jurisdiction over how shipments of LNG are allocated between countries or priced.

Nor, given the international nature of the LNG business, is it clear that there is any basis by which either FERC or any state PUC even *could be given* such authority -- unless suppliers voluntarily agree to be regulated by the U.S. government or some not-yet-created international Agency.

To the extent suppliers remain free to re-allocate LNG to different markets on a short-term basis, however -- as they presumably will remain free to do -- this could greatly magnify the risk of severe price spikes in the natural gas market in the U.S. -- price spikes that could quickly spill over into electricity markets as well.

As a result, the \$ 125 billion + U.S. natural gas market and the \$ 300 billion + electricity market (two of the largest segments of our economy), could become exposed to severe new price risks that have never previously existed in the U.S. market.

This is because, unlike a domestic producer (whose only alternatives are to sell into the U.S. market or not sell its gas at all), to the extent an LNG supplier reserves a portion of its output for short term sales *it will not necessarily be required to sell this output into the U.S. market at all.*

Instead, if it can fetch a higher price, it presumably can -- *and will* -- sell its LNG to a purchaser in China, or India, or Japan or Great Britain or Spain or the Netherlands or anywhere else in the world where it believes it can obtain a higher price than it can obtain in the U.S.

Unlike a domestic producer, therefore, it is not faced with a "Hobson's choice," where if it

withholds production from the U.S. market, its profits and revenues potentially will suffer since it has no other way to make a sale.

Instead, in order to maximize its profits, it has every incentive to divert cargoes that might ordinarily have been delivered to the U.S. to any market anywhere in the world in which it can obtain a higher price – and presumably will do just that.

The potential impact that this is likely to have on the volatility of natural gas prices in the U.S. market should not be underestimated.

In a tight U.S. market, there already was evidence this past summer that the ability of Japanese buyers to outbid the U.S. for a small number of LNG cargoes originally expected to be delivered into the U.S. market but ultimately diverted to Japan (including at least one cargo from Trinidad reportedly shipped halfway around the world to satisfy demand this summer in the Japanese market) was sufficient to significantly affect the price of natural gas futures traded on NYMEX – possibly by as much as 50 cents per MMBTU.

Further, even though LNG still accounts for less than 3 % of U.S. supplies, in a recent research report, Goldman Sachs suggests that the need to compete with other countries for spot market cargoes of LNG could become one of the dominant factors driving natural gas prices in the U.S. this coming winter. This in turn potentially could become a powerful factor driving natural gas prices in the U.S. market towards parity with oil at a time when oil prices may be reaching a new all-time high.

If the U.S. continues to pursue a heavily LNG-dependent strategy, in another 5 to 7 years, up to several BCf per day of expected U.S. natural gas supply may be vulnerable to being diverted at any time to any of a number of other major markets around the world.

The sudden shut of nuclear units in Japan, for example, or the rupture of a major natural gas pipeline in Europe, and the subsequent diversion of LNG originally expected to be delivered to the U.S. to those markets, might suddenly reduce the natural gas supply available to the U.S. market not just by a few cargoes but by 3, 4 or even 5 BCf a day – at least unless U.S. purchasers were willing to engage in a bidding war in which they outbid every other purchaser in the world for limited available supplies of LNG.

This in turn could result in unprecedented increases in the spot market price of natural gas in the U.S. – increases that would apply not just to purchasers of LNG, but to every purchaser of natural gas in the U.S. market *from any source* who is obligated to pay the spot market price for natural gas at the time the event occurs.

The economic consequences of a major diversion of LNG supplies away from the U.S. market, therefore, could be truly staggering – i.e., potentially several times greater than the impact of the loss of production caused by Hurricane Ivan last fall. Indeed, just the *potential* for such a loss of supply could add significantly to the price volatility of natural gas in the U.S. market.

If a major shift in supply to other markets were to occur during the hottest period of the

summer, for example, or during the heart of the winter heating season, and last for an extended time period, increases in the total costs incurred by purchasers of natural gas on the order of \$ 5 to 10 billion in the natural gas market alone are not by any means out of the question.

If the shift occurred in the summer, and the impact then rippled through the electricity market, the total cost to U.S. energy users easily could be 2 to 3 times this amount.

Further, even if U.S. purchasers ultimately outbid other competitors for the available supplies and the cargoes originally expected to be delivered to the U.S. market remained here, the need to potentially outbid other competitors all over the world, in natural gas markets that like the U.S. market essentially are operating with zero reserves, could create just as severe an increase in the spot market price of natural gas. It is also possible that, in some years, disruptive events of this nature could occur several times in one year.

There are, of course, solutions that potentially could be crafted to avoid some of these problems.

At least in theory, for example, if suppliers were so inclined, they could make binding commitments to deliver whatever portion of their output they plan to deliver into the U.S. market on a firm basis 100 % of the time whenever their facilities are operating and never divert these shipments to other markets.

If commitments of this nature were made, then from a functional standpoint, at least in some respects, LNG would become more similar to a domestic source of supply (although there still would be a greater risk of supply interruptions of the type discussed in item # 6 above).

Given the obvious risks involved with a heavily LNG-dependent strategy, however, absent such a commitment, the vulnerability of the U.S. market to severe price spikes is likely to be unprecedented.

In all likelihood therefore, if we continue along our current path, it will only be a matter of time until we begin experiencing a new generation of crises in the natural gas markets in the U.S., in which U.S. prices suddenly spike to unprecedented levels *not* because of events here but because of events in other markets beyond our control (e.g., most recently, just in the last few weeks, poor hydro availability in Spain – which apparently was made up for almost entirely by increased imports of LNG into Spain, a significant portion of which apparently consisted of cargoes diverted from the U.S. market).

Further, given the close link between natural gas prices and the wholesale price of electricity, particularly in the summer months, it may be inevitable that these crises will spill over into Regional electricity markets as well, with consequences that may ripple through much of the U.S. economy.

These losses in turn could wipe out in a heartbeat any benefits that might have been obtained by a decision to massively increase imports of LNG.



### Need for a Thorough, Objective Assessment of Available Options

For the reasons discussed above, there is a compelling need to assess far more rigorously than has been done to date:

1. How much additional LNG realistically can be expected to be available to the U.S. market each year in the future;
2. The specific time schedule, price terms and other potential terms and conditions under which it is likely to be made available;
3. The alternative paths that might be pursued to meet U.S. energy needs, both in the relatively near-term (i.e., between now and 2010 or 2012) and over the longer term;
4. The specific actions that are required in order to move forward with these potential alternative sources of supply;
5. The risks and benefits of these alternative strategies versus a strategy of heavy dependence upon LNG;
6. Whether it is necessary to impose at least some regulatory restrictions on LNG imports in order to protect U.S. economic interests and avoid the potential for severe price spikes in the U.S. natural gas and electricity markets; and
7. What our fall-back strategy might be if, for any reason, total imports of LNG in any year don't achieve the levels assumed in EIA's most recent estimates.

This assessment is necessary, fundamentally, for two primary reasons:

- First, the prospect that LNG imports *might* increase dramatically is already having a *huge* chilling affect on the development of alternative domestic resources.

Major energy companies take EIA's forecasts seriously, even though in recent year's EIA's forecasts often have been far off the market and its estimate of future LNG imports has increase 8-fold over the past three years and may well need to be revised back downward at some future date. (Notably, this 8-fold increase in EIA's estimate of the likely level of future LNG imports in the space of just 36 months has occurred even though the lead time for major LNG projects typically is among the longest of any major projects in the world.)

As a result, at a time when EIA is still predicting that natural gas prices will *fall* by almost 25 % over the next 7 years in inflation-adjusted dollars, based in large part on the assumption that massive amounts of LNG will be delivered into the U.S. market and that oil prices also will be falling during this period, domestic natural gas

developers are reluctant to undertake projects that will take more than 3 to 5 years to complete.

In part as a direct result of the EIA-fostered belief that huge amounts of LNG are about to flood the U.S. market, for example, rather than investing heavily on exploratory drilling or attempt to develop new fields (which the National Petroleum Council concluded were essential in order to maintain U.S. natural gas production at current levels), natural gas developers in the U.S. have been more inclined to pursue the less riskier path of increasing the density of drilling in existing fields.

This may increase near-term production from these fields. At the same time, however, it inevitably accelerates the date when these fields will begin to rapidly decline.

This chilling affect on longer term development projects, in turn, could easily create a self-fulfilling prophecy, accelerating the decline in U.S. production, and leaving end users in the U.S. market with no alternative other than to bid aggressively for whatever LNG supplies become available on the global market, no matter how high the price, as supplies of natural gas from North American sources available to the U.S. market continue to rapidly decline.

It is essential to break this cycle.

This can be accomplished, however, only by attempting to develop rigorous estimates of the likely time frame for bringing new LNG projects on line and then continuously updating those estimates and making the results public – which EIA has thus far failed to do.

- More fundamentally, however, the stakes for the U.S. in determining how we will meet our future energy needs are simply too high to allow this decision to be made simply by default.

As a practical matter, that is exactly what is occurring currently.

To date, no federal or state Agency has rigorously assessed: (i) whether the assumed increases in LNG imports upon which U.S. energy strategy currently depends are certain to be achieved; or (ii) the potential risks and benefits of a heavily LNG-dependent strategy vs. other available alternatives based upon domestic sources of supply.

This is a potential recipe for disaster.

Energy is the lifeblood of our economy. For the first time in our history, however, beginning as early as 2008, for a key portion of our energy supply, we are depending largely upon the availability of energy from facilities that have not been built (or, in many instances, even broken ground) controlled by the governments of other countries, for whose output we may well be outbid by China, our European allies or any of a number of other countries around the world.

Further, as discussed in earlier sections of this paper, even if these facilities are successfully completed and a significant portion of the LNG from these projects initially is committed to the U.S. market, relying upon LNG as a fuel source will: (i) seriously exacerbate the U.S. balance of payments deficit at a time when the value of the U.S. dollar has been eroding sharply and the size of our balance of payments deficit is becoming an increasingly urgent national concern; and (ii) increase our vulnerability to severe price shocks in the natural gas and electricity markets.

Considerations of simple prudence, therefore, dictate that we examine available alternatives more carefully before making any new long-term commitments to massively expand our dependence upon LNG.

### Recent Mistakes in the Generation Sector

Recent energy industry experience demonstrates quite vividly the potential harm that can result if we fail to systematically assess available options before making major resource commitments that can lock us into a particular strategy for meeting our energy needs for a period of many years.

Between January of 2000 and today, the U.S. has constructed over 220,000 MW of new generating capacity at a cost of over \$ 100 billion – by far the largest construction program in the history of the industry.

This \$ 100 billion expenditure could have been used to build a diverse new fleet of generating units, minimizing our dependence upon any one fuel.

Instead, however, virtually all of the new generating units built over the past 5 years are gas-fired.

As a result, even though these power plants are among the newest, most efficient generating units in the world, many are still operating at only a fraction of their intended capacity. Further, many of the companies that built them have been forced to file for bankruptcy.

Today, virtually no one would defend the decision to rely almost exclusively on gas-fired generating capacity to meet our incremental generating requirements during this decade.

Instead, by any measure, it has been a colossal mistake – one of the greatest public policy failures of our time.

The adverse consequences of this mistake often are not fully recognized, even within the industry.

The decision to rely on almost exclusively on gas-fired generation, however, rather than building a more diverse mix of generating units, has been a major cause of the near-tripling of natural gas prices that has occurred over the past three years.

This in turn has caused massive harm – literally a hundred billion dollars or more in potentially avoidable costs -- not just or even primarily to the developers of these power plants, but to natural gas and electricity users in every segment of the economy. It has also caused the loss of tens of thousands of jobs and forced numerous U.S. businesses to shut down or relocate overseas.

Further, it has backed the U.S. into a corner, forcing us to consider massively expanding our dependence upon another imported fuel in addition to imported oil (i.e., LNG) at a time when there is an urgent need to reduce the U.S. balance of payments deficit.

A decision to massively increase imports of LNG, however, would be likely to result in exactly the same type of harm to energy users and to the U.S. economy as the decision earlier in this decade to build nearly-exclusively gas-fired generating units – potentially forcing *every* natural gas and electricity consumer in the U.S. to pay literally hundreds of billions of dollars in increased costs for natural gas and electricity over the next 20 to 25 years as a result of an ill-advised strategy for meeting the basic energy needs of our economy and potentially irreparably damaging the ability of many U.S. companies to compete in world markets.

The mistakes made in the generation sector should demonstrate quite clearly the importance of conducting a thorough, objective integrated planning process at the state and federal level before major new resource commitments are made.

It would be unfortunate, to say the least, if the energy industry proceeded to make its next major resource planning decision with a similar lack of systematic evaluation of the risks and benefits of available alternatives.

To date, however, there is very little evidence that, as an industry, we have learned from our previous mistake.

### Importance of Timing

For a systematic assessment of alternatives to be of value, however, it must begin at once.

This is in part because the available options – e.g., more aggressive, larger scale conservation efforts, major new natural gas developments efforts in as yet undeveloped fields, rapid national deployment of coal gasification on a major scale, etc. – are likely to take a number of years to deploy on a large enough scale to provide a meaningful alternative to massively increasing imports of LNG.

For these alternatives to provide credible alternatives, therefore, it is essential that we begin to develop a comprehensive new national energy strategy at once, so that available alternatives can be identified and implemented in a timely manner on a large enough scale and at an earlier enough point in time to become realistic alternatives to a heavily-LNG dependent strategy.

At this point, no major U.S. energy user has made a major new long-term commitment to purchase LNG for many months. The time is rapidly approaching, however, when new commitments will become necessary. Further, when these commitments are made, they are likely to commit literally hundreds of billions of dollars in revenues for periods of up to 20 to 25 years.

Like the decisions to build almost exclusively gas-fired units several years ago, once binding commitments of this nature are made, the potential obstacles to pursuing alternative strategies for meeting our energy needs will increase exponentially -- potentially for many years.

It is critical, therefore, that leaders at both the federal and state level take advantage of the limited window of opportunity that still remains to: (i) compare an LNG-intensive strategy to other possible sources of supply; and, if these projects are more cost effective and in the long-term strategic interests of the U.S., (ii) take steps to ensure that they are initiated in a timely manner.

### Conclusion

It is perhaps worth reiterating that increased imports of LNG can, should and almost certainly will play an important role in meeting our future energy needs.

We are in a deep hole; however desirable it might be to avoid increases in our dependence upon another imported fuel, increased imports of LNG undoubtedly will play a role in helping us to dig our way out of this hole.

The open issue, therefore, is not *whether* it is desirable to allow increased imports of LNG, but *the extent to which* we should rely on increased LNG imports versus other available alternatives that rely upon domestic sources of supply.

In evaluating this issue, we need to be mindful both of the potential benefit of being able to rely upon LNG as an additional source of energy and its potential limitations and risks.

While at least some new LNG projects undoubtedly will be built, there is a substantial possibility that the global LNG market will never grow to the level many envision – or potentially even reach ½ or 1/4<sup>th</sup> of the size some predict. Further, even if it does, it ultimately could take 30 years or more to reach this level.

The output from most existing projects and most projects currently under construction, however, already is committed to other markets and therefore of little direct benefit to the U.S. market.

While LNG developers often publicly announce ambitious “soft” target dates for completion of potential new projects, these target dates have little significance until contractually binding commitments are made with firm deadlines enforceable by meaningful penalties.

Few if any of the next tranche of projects have reached this stage.

Instead, for the most part, supplies from the next tranche of projects (to the extent there is one) are not likely to be available for delivery until 2012 or 2014, at the earliest.

This is too late to meet the most pressing needs of the U.S. market.

Indeed, one of the greatest risks of the current U.S. strategy of “hoping that LNG will solve our problems” is the near-certainty that what will occur instead is that, even in a “best case” scenario in which many new LNG projects ultimately are completed (to the extent that is a desirable result) there nonetheless will be a massive natural gas supply deficit in the U.S. market during the period between 2008 and 2012.

Realistically, despite EIA’s forecasts, most experts in the international LNG community expect that

very little of the potential production from the second round of projects is likely to yet be available for commercial delivery until, at the earliest, the tail end of this period. In the interim, however, there currently is no other plan in place as to how the incremental natural gas requirements of the U.S. economy are likely to be met.

Further, even if these projects are completed, countries from all over the world will be competing with the U.S. for the output of these projects – most of whom do not have a fraction of the domestic energy resources available that we have available to us in the U.S.

For many of these countries, in a world in which oil supplies may soon peak, there may be few alternatives new sources of energy available. Outbidding the U.S. for the output of these projects, therefore, may literally be the only way for the economies of many of these countries to continue to expand.

This raises significant issues as to: (i) how much LNG realistically will be available to meet U.S. needs, especially given the greater distance of the U.S. from most major potential sources of supply; and (ii) why we would want to compete with these countries when we still have untapped resources here in the U.S. that almost certainly provide a lower cost solution for meeting U.S. need and provide other major benefits to our economy.

In addition, there may even be serious question as to whether it is morally appropriate for us to attempt to outbid these countries for the limited supplies of LNG that are likely to become available on the world market when we have other means to satisfy our energy needs and many other countries do not.

To the extent we are successful in outbidding many of these countries, we may literally be guaranteeing that the growth of their economies will grind to a halt, even though there are other means available to satisfy U.S. needs.

Further, just as significantly, from a purely economic standpoint, the near-certainty of fierce competition for limited available supplies of LNG in a supplied-constrained global market for both natural gas and oil creates a very high likelihood that, in the end, prices for newly available supplies of LNG will be closely tied to the BTU equivalent price of oil (which already is used as the basis for indexing LNG prices in most LNG contracts).

If LNG ultimately is priced in terms that are functionally equivalent to oil, however, rather than helping to break the emerging link between oil prices and the price of natural gas and electricity, a heavily LNG-dependent strategy for meeting the incremental energy needs of the U.S. economy will virtually guarantee that the price for all three major forms of energy in the U.S. market (i.e., electricity and direct use of oil and natural gas) will rapidly converge.

It is difficult to see, however, why it is in the best interests of the U.S. to head voluntarily down a path in which the prices of all three major forms of energy used in the U.S. market are destined to quickly converge.

There is no need for us to do so.

We still have the ability, if we choose to do so, to supply virtually all of our incremental energy requirements from domestic energy resources (e.g., natural gas, renewable energy, coal and nuclear energy) the pricing of which historically has *not* been tightly linked to the price of oil and -- unlike LNG traded in a global market -- still has the potential to be de-linked from oil in future years.

Virtually the *only* reason that ordinarily is offered for not pursuing an energy strategy based predominantly on domestic resources is the claim that is sometimes made that LNG is preferable from an environmental standpoint, because it allegedly leads to lower emissions of EPA-regulated air pollutants and greenhouse gases than one of the potential domestic alternative sources of energy (i.e., coal).

The validity of this claim, however, is less than clear-cut. A state-of-the-art coal-fired plant generally has close to zero emissions of most EPA-regulated pollutants. By contrast, LNG, used to generate electricity in a combined cycle plant, is likely to have *higher* emissions of most EPA-regulated pollutants, not the reverse.

In the public debate regarding LNG, proponents of LNG often point to the fact that a combined cycle unit burning natural gas has a lower emission rate of CO<sub>2</sub> than a conventional steam-fired generating unit burning coal or oil to imply that LNG has a lower emission rate of "greenhouse gases."

This fails to take into account, however, the large amounts of energy that are required to cool natural gas down to - 260 degrees Fahrenheit, ship it potentially half way around the world and then re-gasify it.

The energy lost during this process eliminates a significant portion of the difference in emissions in CO<sub>2</sub> that otherwise would exist between a combined cycle unit burning natural gas and a state-of-the art pulverized coal-fired plant or coal gasification project.

There are, of course, many other issues that should be considered as part of a comprehensive review of LNG and other available alternatives that are beyond the scope of this paper.

The fundamental message of this paper, however, is relatively straightforward: given the potential stakes for the U.S., we can not afford to repeat the mistake made during the first ½ of this decade when we built \$ 100 billion of gas-fired generators without seriously considering other potential strategies, by continuing down a path that commits us to massively increase our imports of LNG without ever seriously *considering* available alternative domestic sources of energy that might better meet the needs of the U.S. economy and the long-term strategic objectives of our country.

Without any extended analysis, discussion or debate, in the past 36 months, however, that is exactly what we have allowed to happen.

We have shifted from not planning to rely on increased imports of LNG to any significant degree to becoming almost entirely dependent upon a combination of increased LNG imports (which are projected to grow by a total of 5.72 TCf per year over the next 20 years) and the successful completion of the Alaskan natural gas pipeline (which conceivably may not be built, but if it is, will increase natural gas supplies by another 1.80 TCf per year) to satisfy 87.7 % of our incremental

natural gas requirements for the next 20 years and provide virtually all of the fuel needed to expand utilization of the nation's existing fleet of gas-fired generating units.

It's as if we had an opportunity to make a fresh decision on whether we would choose to become dependent upon imported oil as one of the primary energy sources for the U.S. economy – and instead of exploring alternatives, cavalierly chose to go down exactly the same path we are traveling down now, knowing all of the potential adverse impacts on national security and on the U.S. economy of relying on imported oil, without any effort to even identify, much less evaluate, potential alternative strategies for meeting U.S. energy needs.

This makes no sense.

Our last chance to seriously consider alternatives to a massive increase in imports of LNG, however, could begin to disappear soon.

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